

## Claims

What is claimed is

1. A valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5 a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a non-vertical cross-section extending through said valve housing.

2. The valve base module of Claim 1 wherein said non-vertical plane is disposed at an offset angle  $\alpha$  relative to a vertical plane defined by said longitudinal axis and a vertical cross-section extending through said valve housing.

3. The valve base module of Claim 2, wherein said non-vertical plane is substantially perpendicular to said vertical plane.

4. The valve base module of Claim 2, wherein said non-vertical plane is perpendicular to said vertical plane.

5. The valve base module of Claim 2, wherein said offset angle  $\alpha$  satisfies a relation  $0 < \alpha < 360^\circ$ .

6. The valve base module of Claim 2, wherein said offset angle  $\alpha$  satisfies a relation  $\alpha \approx 90^\circ$ .

7. The valve base module of Claim 2, wherein said offset angle  $\alpha$  satisfies a relation  $\alpha = 90^\circ$ .

8. The valve base module of Claim 2, wherein said offset angle  $\alpha$  permits one or more of at least P, T, A, and B ports to connect a bottom surface of said valve housing to a top surface of said valve housing.

9. The valve base module of Claim 2, wherein said offset angle  $\alpha$  permits one or more of at least P, T, A, and B ports to connect a bottom surface of said valve housing to a top surface of said valve housing to form one or more of at least P', T', A', and B' ports.

10. The valve base module of Claim 2, wherein said offset angle  $\alpha$  permits one or more of at least P, T, A, and B ports to connect a bottom surface of said valve housing to a top surface of said valve housing to form one or more of at least P', T', A', and B' ports that permit one or more additional modules to be mounted thereon.

11. The valve base module of Claim 2, wherein said offset angle  $\alpha$  permits one or more of at least P, T, A, and B ports to connect a bottom surface of said valve housing to a top surface of said valve housing to form one or more of at least P', T', A', and B' ports that permit one or more additional modules to be mounted thereon, wherein said bottom surface conforms to

5 a standard mounting pattern.

12. The valve base module of Claim 1, wherein said valve element is moveable within said longitudinal bore.

13. The valve base module of Claim 1, further comprising means for moving said valve element within said longitudinal bore.

14. The valve base module of Claim 13, wherein said means for moving said valve element comprise means selected from the group consisting of manual means, mechanical means, electrical means, magnetic means, hydraulic means, and pneumatic means.

15. The valve base module of Claim 1, wherein said valve base module operates as a two-way, three-way, or four-way valve.

16. A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5 a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing; and

10 ii) a pilot control module in communication with said valve base module, said pilot control module configured to be able to move said valve element within said longitudinal bore.

17. The modular valve system of Claim 16, wherein said pilot control module contains a pilot control valve assembly.

18. The modular valve system of Claim 17, wherein said pilot control valve assembly is an integrated component of said pilot control module.

19. The modular valve system of Claim 16, wherein said pilot control valve assembly is configured to actuate said pilot control module in on-off operation.

20. The modular valve system of Claim 16, wherein said pilot control valve assembly is configured to actuate said pilot control module in proportional operation.

21. The modular valve system of Claim 16, wherein said pilot control valve assembly is configured to actuate said pilot control module in servo operation.

22. The modular valve system of Claim 16, wherein said pilot control valve assembly is configured to actuate said pilot control module in at least more than one of on-off operation, proportional operation, and servo operation.

23. A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5 a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing;

10 ii) a pilot control module in communication with said valve base module, said pilot control module configured to move said valve element within said longitudinal bore; and

iii) a power supply module in communication with said pilot control module, said power supply module configured to operate said pilot control module.

24. The module valve system of Claim 23 wherein said power supply module is a low power device.

25. The module valve system of Claim 23 wherein said power supply module accepts universal inputs.

26. The module valve system of Claim 25 wherein said universal inputs include at least one or more of a 12 volt DC input, 24 volt DC input, 48 volt DC input, 120 volt AC input, 250 volt AC input, 460 volt AC input, 50 Hertz input, and 60 Hertz input.

27. A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5 a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing;

10 ii) a pilot control module in communication with said valve base module, said pilot control module configured to move said valve element within said longitudinal bore;

iii) a power supply module in communication with said pilot control module, said power supply module configured to operate said pilot control module; and

15 iv) a thermally insulating module to thermally isolate said pilot control module from said power supply module.

28. A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5 a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing; and

- 10        ii) a pressure reducing module in communication with said valve base module, said pressure reducing module configured to be able to reduce pressure to said valve base module.

29.     The modular valve system of Claim 28, wherein said pressure reducing module contains a pressure reducing valve cartridge.

30.     The modular valve system of Claim 29, wherein said pressure reducing valve cartridge is an integrated component of said pressure reducing module.

31.     A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

- 5        a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing; and

- 10        ii) a diagnostic module in communication with said valve base module, said diagnostic module configured to be able to communicate data about said valve base module.

32.     The modular valve system of Claim 31 wherein said diagnostic module contains a shuttle valve assembly.

33. The modular valve system of Claim 32 wherein said shuttle valve assembly is an integrated component of said diagnostic module.

34. A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5 a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing; and

10 ii) a load sense module in communication with said valve base module, said load sense module configured to be able to sense a highest load pressure between at least some of said chambers.

35. A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5 a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing; and

10            ii) a position feedback sensor module in communication with said valve base module, said position feedback sensor module configured to be able to sense a position of said valve element within said longitudinal bore.

36.        The modular valve system of Claim 35 wherein said position feedback sensor module attaches directly to said valve element.

37.        A modular valve system, comprising:

i) a valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5            a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a cross-section extending through said valve housing; and

10           ii) a manual override module in communication with said valve base module, said manual override module configured to be able to manually control said valve base module.

38.        The modular valve system of Claim 37 wherein said manual override module attaches directly to said valve element.

39.        A valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

5            a valve element disposed within said longitudinal bore, said valve element having one or more lands that divide said longitudinal bore into a plurality of chambers; and



a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a non-vertical cross-section extending through said valve housing,

wherein the valve base module is configured for single sub-plate mounting.

40. A valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

a valve element disposed within said longitudinal bore, said valve element having one or  
5 more lands that divide said longitudinal bore into a plurality of chambers; and

a tank core passage connecting at least some of said chambers, said tank core passage extending through a non-vertical plane defined by said longitudinal axis and a non-vertical cross-section extending through said valve housing,

wherein the valve base module is configured for bar manifold mounting.

41. A valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

a valve element disposed within said longitudinal bore, said valve element having one or  
5 more lands that divide said longitudinal bore into a plurality of chambers; and

means for connecting one or more of at least P, T, A, and B ports from a bottom surface of said valve housing to a top surface of said valve housing.

42. A valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said valve housing;

a valve element disposed within said longitudinal bore, said valve element having one or  
5 more lands that divide said longitudinal bore into a plurality of chambers; and

means for connecting one or more of at least P, T, A, and B ports from a bottom surface  
of said valve housing to a top surface of said valve housing, said means comprising a tank core  
passage connecting at least some of said chambers.

43. A valve base module, comprising:

a valve housing having a longitudinal bore extending about a longitudinal axis of said  
valve housing;

a valve element disposed within said longitudinal bore, said valve element having one or  
5 more lands that divide said longitudinal bore into a plurality of chambers; and

means for connecting one or more of at least P, T, A, and B ports from a bottom surface  
of said valve housing to a top surface of said valve housing, said means comprising a tank core  
passage connecting at least some of said chambers, said tank core passage extending through a  
non-vertical plane defined by said longitudinal axis and a non-vertical cross-section extending  
10 through said valve housing.